

### Remarks/Arguments

Attorney for Applicants submits this Letter in response to the Office Action dated February 18, 2009.

Applicants have maintained all claims in the subject application to facilitate the Examiner's consideration of rejoining of the claims upon allowance of Group I claims, presently being considered. Applicants have amended all of the claims to be consistent and, thereby, to facilitate rejoinder if deemed appropriate.

The amendment to the claims, as presently presented, are made to merely provide further emphasis that the block copolymer is formed of block segments from prepolymer (P<sup>A</sup>) with block segments from prepolymer (P<sup>B</sup>) and not merely a mixture of polymers P<sup>A</sup> and P<sup>B</sup>. The claims, as presently presented, do not require further consideration and/or search on the part of the Examiner. Entry into the present application is respectfully solicited.

The claims presently under consideration are directed to oxygen scavenging film and laminate products. By definition, oxygen scavenging requires the oxygen scavenging material to be exposed to the internal atmosphere of a closed container to provide a means of effectively removing oxygen from the atmosphere directly surrounding the product to be protected (e.g. food products, beverages such as wines and the like). Containers (film containers and semi-rigid and rigid containers) formed of presently claimed products thus have a layer exposed to the container inner atmosphere, which consists essentially of the specifically defined block copolymer of the present invention and a catalytic amount of a transition metal compound, complex or salt. The presently claimed product provides a means of effectively scavenging oxygen from the atmosphere of a closed container under both ambient and refrigeration conditions as commonly used in the food and beverage industry without causing by-product formation which may taint the taste, odor or color of the packaged material.

The presently claimed invention is directed to a film or a laminate product having at least one layer composed of oxygen scavenging composition consisting essentially of a catalytic amount of a transition metal and a block copolymer having blocks (long polymeric chain segments) formed from a first pre-polymer ( $P^A$ ) and from a second pre-polymer ( $P^B$ ). The pre-polymer ( $P^A$ ) forming the first blocks is required to contain cycloalkenyl groups, be present in from 20 to 80 weight percent of the resulting block copolymer, have a  $T_g$  of lower than about minus 20°C and have functional groups that cause it to form linkages with prepolymer ( $P^B$ ) which, in turn, are thermoplastic; have a  $T_m$  higher than +30°C and have functional groups that have the ability to react with functional groups of ( $P^A$ ).

The presently claimed block copolymer has been unexpectedly found to act as an oxygen scavenger agent under both ambient, room temperature conditions (ca. +20°C - +30°C) and refrigerated low temperature conditions (ca. < +20°C to - 20°C) as well as exhibit a high degree of compatibility with conventional film forming polymers to provide a desired tack-free, haze-free packaging product.

The Examiner has indicated that in her review of the claims, she reads the claimed phrase "consisting essentially of" (See Claim 1, l. 2; Claim 9, l. 4) to be equivalent to "comprising". Such is inconsistent with well established practice. Ex parte Davis 80 USPQ 448; In re Herz and Willis, 190 USPQ 461. By the Court's directive, the present claim terminology reads that the material components forming the at least one oxygen scavenger layer of the claimed film or laminate be limited to the block copolymer and transition metal catalyst, as specifically defined.

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The sole rejection of the claims under active consideration (with respect to Claims 1-5, 7-13 and 15-16) is made under 35 USC §103(a) over the combined teachings of Ito et al. (USP6458437), Chang et al. (USP 4485228) and Taylor (USP 4038228). It is respectfully submitted that the presently claimed invention is patently distinct from the teachings of the cited references taken singly or in

combination, as discussed herein below. Withdrawal of the rejection is respectfully solicited.

The Examiner cites Ito et al as disclosing a heat shrinkable polyester film comprising a polyester elastomer which is a polyester block copolymer. This is not totally correct. A full reading of the Ito et al reference shows that it is clearly directed to the formation of *mixtures* of conventional polyesters polymers with polyester block copolymers (See Col. 1. 11-29 and Claim 2), each present in certain specific amounts within the mixture composition. Ito et al's clearly teach that the two types of polymeric components are material to providing the desired composition and, further, that the polyester block copolymer component be the minor constituent of the composition. The composition of Ito et al. is taught to provide improved film labels that are substantially free of imperfections and suitable for wrapping around the outside of bottles and the like.

There are several distinctions between the teachings of Ito et al. and the presently claimed invention.

**Firstly, the film product of the presently claimed invention has activity as an oxygen scavenger not taught nor applicable to Ito et al.'s polyester elastomer, per se, nor to the composition of mixed polyester resin and polyester elastomer taught by Ito et al.**

It has been noted by the Examiner that Ito et al. does not teach nor suggest the use of non-aromatic, cycloalkenyl group containing polymers no less any material capable of acting as an oxygen scavenger. (See discussion below with respect to Examiner's attempting to overcome this defect by combining Ito et al with Chang).

Ito et al. direct one skilled in the art to compositions useful to form films around the outside of bottles, as labels that exhibit reduced defects "of wrinkles, shrinkage spots, strains and shrinkage failure." Such utility and its taught position on the outside of the packaging containers would not lead one skilled in the

scavenging art to deem the teaching of Ito et al. to be relevant to the technology useful for oxygen scavenging purposes.

The presently claimed film composed of a layer of the subject block copolymer has been found useful as an oxygen scavenger for the atmosphere *within* a package. It is well recognized that such a film needs to be exposed to the *interior environs* of a package to thereby limit the exposure of oxygen sensitive packaged materials to oxygen laden atmosphere of conventional packaging.

It is respectfully submitted that one skilled in the art of oxygen scavenger technology would not be directed to improve such technology by the teaching of Ito et al.

**Secondly, the film product of the presently claimed invention is distinct from that taught and/or suggested by Ito et al. The presently claimed products require a layer consisting essentially of certain defined block copolymer having non-aromatic, cycloalkenyl groups therein and a catalytic amount of a transition metal compound, complex or salt.**

Ito et al clearly directs one to form films by providing a mixture of a polyester resin with a polyester elastomer (polyester block copolymer). Each of these polymers is a required material component of Ito's film forming composition. Ito teaches that their polyester elastomer should be present in limited, minor amounts, preferably limited to 5 to 10 percent (See Ito et al. at Col. 2, l. 11-20) with the remainder derived from the polyester resin. Ito et al. goes further to instruct one (See Ito et al. Col. 2, l. 19-29) to utilize the polyester elastomer component to low amounts as high amounts will have detrimental effects on formation of their film products.

Further, each of the examples provided by Ito et al. show (See Col. 8 and 9) the use of *physical mixtures* of various polyester resins with small amounts of polyester elastomer. Each of the examples given illustrates and emphasizes the use of a combination of two material and distinct polymers physically mixed together and used as the formed mixture.

In difference, the presently claimed film and laminate products are directed to comprising a layer consisting essentially of the presently defined block copolymer in combination with a transition metal catalyst. The use of prepolymers P<sup>A</sup> and P<sup>B</sup> to provide the resultant block copolymer can not be deemed to be a mere mixture of these components. They are reagents used to form the desired block copolymer. Thus, the teaching of Ito et al would not direct or suggest the presently claimed product wherein the layer consists essentially of Applicant's claimed block copolymer.

**Thirdly, the products of the presently claimed invention are composed of a block copolymer that is distinct from and not suggested by the block copolymer utilized by Ito et al.**

The Examiner admits that "Ito fails to disclose the claimed alicyclic non-aromatic compound (the (a) unit for the prepolymer (P<sup>A</sup>)." It is this element which is the key element to providing oxygen scavenging capability to the resultant block copolymer. Absence of this element clearly establishes the inappropriateness of the Ito teaching with respect to the present technology and the lack of any direction to aid one to improve oxygen scavenging properties. The remaining components of the block copolymer provide an improved oxygen scavenging product capable of use at ambient and refrigeration conditions and the ability to be processed into a tack free film.

The presently claimed invention is clearly directed to a film product having at least one layer having non-aromatic, cycloalkenyl group containing polymers that are formed from a combination of certain specifically defined pre-polymers, P<sup>A</sup> and P<sup>B</sup> in certain ratios. Applicants have unexpectedly found the presently claimed product to be capable of overcoming certain problems commonly associated when designed to have low T<sub>g</sub> (e.g. lack of scavenger properties at refrigeration temperatures, high tack at room temperatures, difficulty to form into films using conventional apparatus).

Ito et al. fail to teach or suggest the formation of block co-polymers or of segments formed from pre-polymers having non-aromatic, cycloalkenyl groups, as required by the presently claimed invention. Ito et al's polyester elastomer is a distinctly different polymeric material used for and in a manner distinctly different from that of the present claimed invention.

It is respectfully submitted that Ito et al. fail to teach or suggest the formation of block co-polymers useful as oxygen scavenger and does not teach or suggest block copolymers having functional cycloalkenyl groups defined by the present claims.

**The teachings of Chang et al does not overcome the defects of Ito et al to direct one to the presently claimed invention.**

As stated above, the Examiner admits that "Ito fails to disclose the claimed alicyclic non-aromatic compound (the (a) unit for the prepolymer P<sup>A</sup>)."

The Examiner attempts to overcome the defects of Ito et al. by the teachings of Chang et al. The Examiner proposes that the Chang et al teaching that terephthalic acid (used by Ito et al.) and tetrahydrophthalic acid (or its anhydride), contained within the teachings of Chang, are functional equivalent compounds and, therefore, one skilled in the art "would have found it obvious to substitute tetrahydrophthalic acid (or its anhydride) for the terephthalic acid of Ito." It is respectfully submitted that the teachings of Chang et al. does not establish equivalency in a manner that would provide one skilled in the art the presently claimed invention nor does it suggest substitution into the teachings of Ito et al. for the reasons stated herein below.

Applicants admit that according to basic polymer chemistry one can form polyester polymers by the reaction of diols with dicarboxylic acids or their anhydrides through polycondensation. Each polyester will have distinct physical and chemical properties depending on the particular starting diol and/or di-acid or anhydride.

With respect to the substitution proposed by the Examiner, it must be noted that Chang merely teaches (4:49-64) that their polyester is formed by "reacting an organic polycarboxylic acid or a functional equivalent thereof...with an organic polyol....Diacids are preferred, although higher functional polyacids can be used." It is clear that the functionality of importance in Chang et al is the carboxylic acid group and not the organic moiety bridging the acid groups. Chang et al. teach that *all* organic di- and polycarboxylic compounds are encompassed by their teaching to form their desired resins. Chang et al. teaches that the preferred carboxylic acids are "the *aliphatic* ones such as hexahydrophthalic acid or its anhydride". (Emphasis added; 4:62-64). Such teaching, directed to an acid having *cycloalkyl* bridging group (not a cycloalkenyl group, as presently required) would further direct one away from that presently required.

Although a single cycloalkenyl dicarboxylic acid is in the listing of dicarboxylic acid compounds of Chang et al, it is clear that such teaching is not applicable to support the Examiner's position of equivalency with the terephthalic acid of Ito et al. to make obvious the specific block co-polymer of the presently claimed invention. The teachings do not direct one to make the substitution proposed by the Examiner. Some of the reasons are discussed herein below.

Firstly, Chang et al is directed to forming a *thermosetting*, high solid content polyester-urethane composition useful as a coating composition. In contrast, Ito is directed to a heat-shrinkable, *thermoplastic* composition. It is well known in the art that thermoplastic compositions and thermoset compositions are distinct and the teachings related to each are distinct from the other. Other than the broad teachings that relate to the use of polycarboxylic acids with polyols to provide polyesters, those skilled in the art of polymer chemistry would not look to combining the teachings of the cited references, as proposed by the Examiner.

Secondly, Chang et al. teach that *all* organic di- and polycarboxylic compounds are encompassed by their teaching to form their thermoset resins. Chang et al. teaches that the preferred carboxylic acids are "the *aliphatic* ones such as hexahydrophthalic acid or its anhydride". (4:62-64). Such teaching would direct

one to an acid having *cycloalkyl* bridging group and not to an acid having a cycloalkenyl group, as presently required.

Thirdly, when reading Chang et al. in its entirety, the only teaching of equivalency relates to the compounds being dicarboxylic acids. However, the terephthalic acid and the tetrahydrophthalic acid both listed are distinctly different chemically and the resultant polymers are different chemically and physically.

- Terephthalic acid is an aromatic compound while tetrahydrophthalic acid is a non-aromatic, cycloalkenyl (cyclohexenyl) compound.
- Terephthalic acid, when condensed with ethylene glycol (1:1) produces a polyester, polyethylene terephthalate (PET). Such products are known to have a  $T_g$  of about 65° - 75°C. The polymer is viewed as a hard polymer. It is not capable of scavenging oxygen.
- Tetrahydrophthalic anhydride (acid), when condensed with ethylene glycol (1:1) produces a polyester, polyethylene tetrahydrophthalate. Such products (compared to PET) are known to have a much lower  $T_g$  of about 15°C. The polymer is viewed as a very soft polymer. It is capable of scavenging oxygen.

Although a single cycloalkenyl dicarboxylic acid is encompassed in the listing of dicarboxylic acid compounds by Chang et al, it is clear that such teaching is not applicable to support the Examiner's position of equivalency with the phthalic acid of Ito et al. to make obvious the specific block co-polymer of the presently claimed invention.

The Examiner seems to have attempted to reproduce the presently claimed invention by combining the cited art with the aid of the present application teachings. Such hindsight rejection is without merit. *Plastering Development Center Inc. v. Perma Glas-Mesh Corp.*, 179 USPQ 838; *Minnesota Mining and Manufacturing Co. v. Johnson and Johnson* 179 USPQ 216. The mere fact that the Examiner finds two isolated teachings that have some generic teaching of commonality even though they are of different fields of art, would not render such teachings combinable by the artisan to produce the presently claimed invention. In



re Pennington, 113 USPQ 81; In re Bergel and Stock 130 USPQ 206. It is clear in the instant rejection that the references do not expressly or by implication suggest the presently claimed oxygen scavenger film or laminate product having the defined block copolymer forming one of the layers therein. Ex parte Clapp, 227 USPQ 972; In re Imperato, 179 USPQ 730.

There is no teaching in either reference to direct one to form an oxygen scavenger film product, as presently claimed, having cycloalkenyl groups therein that are capable of scavenging oxygen under both ambient, room temperature (ca. +20°C - +30°C) and refrigerated low temperature (ca. < +20°C to -20°C) as well as exhibit a high degree of compatibility with conventional film forming polymers to provide desired tack-free, haze-free packaging product using conventional processing equipment and still further to provide said properties without causing formation of by-products which may taint the odor, color or taste of the packaged product.

**The Examiner cites the teachings of Taylor to support obviousness for the inclusion of a transition metal compound, complex or salt as part of the presently claimed invention. It is respectfully submitted that Taylor does not provide a teaching to support the present obviousness rejection.**

Firstly, the teachings of Taylor do not address the defects noted above with respect to the teachings of Ito et al. and/or Chang et al.

Secondly, Taylor directs one skilled in the art to utilize certain transition metal salts for post-use degradation of polymers..

The Examiner states that "Taylor discloses the formation of transition metal salt compounds which improve the degradation of polymers (1:60-2:5, 3:4-13)". Based on this observation, the Examiner comes to the position that it would be obvious "to include a transition metal in the film...in order to form a film which is capable of non-photochemical degradation of the polymer post consumer consumption."

Applicants have found that the presently claimed film product having at least one layer of the defined block co-polymer can have its oxygen scavenging properties catalyzed by the presence of a transition metal salt, compound or complex and that such catalyzed oxygen scavenging can be done without the degradation of the presently claimed block copolymer. This is a highly desired result.

Taylor's teaching of providing a means of degradation of polymers would direct one away from use of his transition metal salts within the present technology.

In summary, the above clearly shows that the teachings of the cited art of Ito et al., Chang et al. and Taylor do not each singly or in combination teach nor make obvious the presently claimed invention. Ito et al. is directed to a mixture of a polyester and a polyester elastomer wherein the latter is distinct from that presently claimed. Chang et al is directed to formation of thermoset polymers having a portion of the polymer composed of a polyester formed from any dicarboxylic acid compound. Chang's teaches that any such compound may be used and mere inclusion in their list of dicarboxylic acids of one that has a cycloalkenyl group is not sufficient to teach equivalency as suggested by the Examiner. Finally, Taylor teaching that the inclusion of a transition metal salt into a polymer composition would cause degradation of the polymer product is contrary to and would direct the artisan away from using it in packaging technology.

The Examiner has taken the position that the physical properties of the reference's polymeric material will inherently be the same as those of the claimed block copolymer in view of the reference teaching the identical chemical structure.. Firstly, Applicants respectfully submit that they have shown herein above that the cited art teachings do not show nor suggest the presently claimed films or laminates having at least one layer of certain defined block copolymers. Even if, arguendo, the subject copolymer was identified by name, as proposed by the Examiner, it is well known that polymers have differing physical properties in view of variations of their molecular weight, variations in amount of each group present, variations in

substitution groups, etc. Thus, the physical properties presently claimed define the particular block copolymers deemed useful with respect to the presently claimed invention.

The Examiner has indicated that the transitional phrase "consisting essentially of" will be construed as equivalent to "comprising" with respect to the instant application. Applicants have discussed the inappropriateness of this interpretation herein above. The claims presently under consideration are directed to oxygen scavenger film and laminate products having at least one layer formed of the defined block copolymer and a transitional metal catalyst. The layer does not have any other components that are materially relevant to the basic and novel characteristics of the presently claimed products.

The Examiner indicates her inability to locate supportive teaching that use of the presently claimed block copolymer provides enhanced oxygen scavenging properties. Such teaching commences on page 5, lines 13-29 and throughout the specification. Further, specific test results related to oxygen scavenging are given in Examples 21 - 40 of the instant application.

It is respectfully submitted that Applicants believe that the Examiner will agree that the presently claimed invention is free from formal and art rejections and, therefore, in condition for allowance. Such action is respectfully solicited.

Respectfully submitted,



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